

Investigating Students' Online Learning Perception Through the Lens of Constructivism

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Abstract: This paper explores students' perception and experience with an online Learning Management System (LMS) and its relationship to the areas that are crucial for a constructivist learning environment. We surveyed 526 college students from a public university in the Philippines to look at their extent, confidence, and satisfaction of using LMS. We also used the Constructivist On-Line Learning Environment Survey (COLLES) to measure the students' preferred and actual experience in terms of the LMS' role in professional relevance, reflective thinking, interactivity, cognitive demand, affective support, and interpretation of meaning. Majority of the students have experience with various LMS and have been using online learning platforms for more than two years. Results showed that students' satisfaction and confidence in using the LMS have a large significant positive relationship. However, a significant difference was found when their preferred experience and actual experience were compared for all the statements of the six COLLES dimensions. This indication that the students' expectations on these aspects were not met during their actual experience is a call to action to both administrators and teachers to ensure that the use of online learning platforms do not hinder the students to actively construct their own knowledge and understanding through experiences and interactions.

Keywords: constructivist online learning environment, learning management system

1. Introduction

As the immediate threat of the pandemic subsided, many schools chose to retain and further develop their online learning systems, recognizing their value in enhancing educational accessibility, accommodating diverse learning styles, and integrating innovative teaching methodologies. The adoption of online learning environments, such as a Learning Management System (LMS), post-pandemic has become a pivotal aspect of modern education, driving schools to continuously refine their digital strategies and tools to better support student engagement and achievement in a technologically evolving landscape.

One crucial aspect in the adoption of LMS is ensuring that they effectively meet the diverse needs of students. This involves creating interactive, engaging, and supportive online environments that facilitate active learning. The principles of constructivist learning theory, which emphasize the importance of learners actively constructing their own understanding through experience and interaction, are particularly relevant in this context. By using LMS platforms that support collaborative learning, critical thinking, and reflective practices, educators can foster a more dynamic and effective online learning experience that aligns with constructivist ideals and better prepares students for the complexities of the modern world.

Additionally, prior research has indicated that online learning is widely accepted and has been effective in enhancing knowledge, boosting confidence, and fostering interest

among students. It has also been demonstrated that online learning is comparable to traditional teaching methods in terms of impacting learners' knowledge. Furthermore, the knowledge acquired through online learning has been found to be better than having no training at all (Baber, 2022; Bahasoan et al., 2020; and Basar et al., 2021). Comparing traditional and online learning in terms of their effectiveness in enhancing learning outcomes, student satisfaction with online courses, time and learning efficiency, and the success of problem-based learning has shown that online learning is at least as effective as traditional face-to-face instruction (Castro and Tumibay, 2021).

This study investigates students' interaction and experience with a learning management system through the lens of constructivism. Specifically, we aim to answer the following questions:

RQ1. What is the relationship between the students' extent of use, confidence, and satisfaction with LMS?

RQ2. How do students rate their actual experience with the LMS in terms of the six COLLES dimensions compared to their preferred experience?

2. Constructivism

Manolo and Fischer (2005) introduced that constructivism is a learning theory that suggests knowledge is best gained through reflecting and actively building understanding in the mind. According to this theory, knowledge is a shared interpretation. Learners need to think about the information being taught and, based on their past experiences, personal views, and cultural background, create their own interpretation. Constructivism has two main branches: radical and social. Social constructivism believes that human development happens in a social context and that knowledge is built through interactions with others. On the other hand, radical, also called cognitive constructivism, argues that building knowledge depends on an individual's personal interpretation of their experiences.

2.1 Constructivist Learning Theory

Constructivist Learning Theory, rooted in the works of Jean Piaget and Lev Vygotsky, posits that learners actively construct their own knowledge and understanding through experiences and interactions with their environment. This theory has significantly influenced educational practices by emphasizing the importance of active engagement, critical thinking, and collaborative learning (Khadidja, 2020). It is grounded in several core principles. Piaget's theory of cognitive development emphasizes stages of learning where children actively construct knowledge through hands-on experiences and problem-solving activities. Vygotsky's social constructivism, on the other hand, highlights the critical role of social interactions and cultural context in cognitive development. Vygotsky introduced concepts such as the Zone of Proximal Development (ZPD) and scaffolding, which underscore the importance of guided learning and support from others who are more knowledgeable.

Zajda (2021) also emphasized that the central concept of constructivism is that meaningful knowledge and critical thinking are actively built through cognitive, cultural, emotional, and social processes. Individual learning is an active process that requires engagement and participation in the classroom. This concept is crucial for developing effective learning environments in schools worldwide. The success of constructivist learning and teaching depends on various factors, including students' characteristics, cognitive, social, and emotional development, individual differences, cultural diversity, a motivating environment, teachers' classroom strategies, the school's location, and the quality of teachers.

Throughout the learning process, the learner is expected to consider the information being taught and construct an interpretation based on their past experiences, personal views, and cultural background. Brau (2020) discussed that after forming this interpretation, the learner reflects on the new knowledge. Radical constructivism posits that the learner sees themselves at the center of the knowledge creation and acquisition process, working through a cycle of acquisition and assimilation. The learner's major role is to reflect on past experiences and be aware of the factors influencing the absorption of new knowledge. Social constructivism also emphasizes reflection but adds a focus on the social aspects of learning. Social constructivism not only acknowledges the learner's uniqueness and complexity but also encourages and rewards it as a crucial part of the learning process. Learners are motivated to reflect on their unique knowledge and recognize their ability to inspire others in their environment. The continuous exchange of ideas within the Zone of Proximal Development (ZPD) allows learners to acquire new understandings from their peers. While learners play a central role in acquiring knowledge in the constructivist framework, instructors still have a significant role.

Further, social constructivism views the learner as an active participant in a socially interactive learning environment. It is a way of understanding where learners work together reflectively to build new knowledge, especially through shared inquiry based on their personal experiences. A key aspect of this collaboration is the development of students' communicative competence, meaning their ability to engage in open and critical conversations with both teachers and peers. This communication involves an empathetic approach to creating mutual understanding and a critical mindset for examining underlying assumptions (Taylor and Maor, 2009).

2.2 Constructivist Online Learning Environment Survey

The Constructivist On-Line Learning Environment Survey (COLLES) was developed by Taylor and Maor (2009) to support the use of the Internet to deliver instruction. Since their teaching was primarily based on social constructivism, they designed the COLLES to help assess the extent to which their online teaching enriches their distance students' ways of learning. The COLLES helps to measure of students' perceptions of both their preferred and actual on-line classroom environments.

The COLLES introduces scales that are innovative in the realm of learning environment research. These scales are rooted in the theory of social constructivism, encompassing aspects such as social constructionism, critical constructivism, co-participation, and socially situated cognition. This theoretical framework is at the forefront of research examining how students' predispositions influence the quality of their interactions in web-based teaching and learning environments. The scales focus on students' perceptions of a virtual classroom that facilitates their development into reflective and collaborative learners (Taylor and Maor, 2000).

The scales assess the following dimensions:

- Professional Relevance - How relevant the online classroom environment is to students' professional perspectives and practices.
- Reflective Thinking - The degree to which critical reflective thinking is stimulated through online peer discussions.
- Interactivity - The level of communicative interaction occurring online between students and between students and tutors.
- Cognitive Demand - The extent to which tutors provide challenges and model effective communication roles.
- Affective Support - The level of sensitive and encouraging support offered by tutors.

- Interpretation of Meaning - How well students and tutors co-construct meaning in a coherent and connected way.

Several recent studies have utilized COLLES to validate an integration model for collaborative learning mediated by an LMS (Aguilar and Perez, 2021), to know level of influence of the COLLES factors on affective support, mediated through the LMS Blackboard Learn, in engineering students (Gutiérrez-Aguilar et al., 2021), explore the relationship of the Affective Support factor (COLLES) with collaborative learning (Aguilar et al., 2020), and to assess the students' expectations on newly developed online course (Suwannaphisit et al., 2021), among others. The COLLES has been designed to enable educators to monitor the extent to which interactive capacity of online environments can be leveraged for engaging students in dynamic learning practices.

3. Data Collection

An online survey adapted from the Constructivist On-Line Learning Environment Survey (COLLES) (Taylor and Maor, 2009) was conducted among 526 students from 5 colleges in a public university from southern Philippines (see Table 1).

Table 1. *Distribution of respondents based on their home college*

College	Agriculture	Arts & Sciences	Business Management	Engineering	Information Sciences & Computing
Responses	41	148	113	59	165

These students have used Google LMS Platform including Google Classroom, Google Forms, and Google Meet as their online learning platform for at least one semester.

The survey was divided into three parts. First, the students provided their college, program, year level, and usage. Name was optional and was anonymized together with the email address during data cleaning and analysis. Next, the students answered questions on satisfaction and confidence in using the platform. The goal of this part is to examine the choices an individual makes to accept or reject the Google LMS to be used as a learning platform. Student participants are requested to assess the Google LMS platform including Google Classroom (interacting with class activities), Google Forms (answering Google Form Quiz), and Google Meet (attending online classes). Statements on satisfaction and confidence in the LMS' function, content, and interaction were provided and students were asked to rate them using a 7-point Likert scale (1 Extremely Disagree to 7 Extremely Agree). The Cronbach's α coefficient for the satisfaction and confidence scale were 0.88 and 0.87, respectively.

The third part of the survey was further divided to 2 subsections: preferred experience and actual experience. Each subsection contains 18 statements corresponding to the six dimensions in COLLES. Three (3) statements were given for each of the following:

- professional relevance - the extent to which engagement in the on-line classroom environment is relevant to students' professional worldviews and related practices
- reflective thinking - the extent to which critical reflective thinking is occurring in association with online peer discussion
- interactivity - the extent to which communicative interactivity is occurring on-line between students and between students and tutors
- cognitive demand - the extent to which challenges and communicative role modelling is provided by tutors

- affective support - the extent to which sensitive and encouraging support is provided by tutors
- interpretation of meaning - the extent to which students and tutor co-construct meaning in a congruent and connected manner

Students were asked to rate each statement using a 5-point Likert scale (1 Almost Never to 5 Almost Always). The Cronbach's α coefficient for the preferred and actual experience scale were 0.97 and 0.98, respectively.

4. Findings

Among the 526 students who responded to the survey, majority (309 students or 59%) have used an LMS for more than 2 years, 159 (30%) for 1-2 years, and 58 (11%) for less than a year. Majority of them (346 respondents or 66%) have used other LMS such as Blackboard, Canvas, Edmodo, and Moodle, while the rest have only used Google LMS. In terms of daily use of the Google LMS, majority of the students spend 1-3 hours (44%) or 3-6 hours (35%) daily on the platform.

When it comes to their satisfaction and confidence in the LMS' function, content, and interaction, students who gave a rating of 5-7 on a 7-point Likert scale (1 Extremely Disagree to 7 Extremely Agree) comprise the majority when combined as shown in the Table 2.

To explore the relationship between the students' satisfaction and confidence ratings, we computed the average of the ratings of the 3 satisfaction and the average of the ratings of the 3 confidence statements for each student. Results of the correlation indicated that there is a significant large positive relationship between their average satisfaction rating and average confidence rating, ($r(524) = .768, p < .001$).

Table 2. *Students' rating on satisfaction and confidence with LMS*

Statements on Satisfaction and Confidence	Extremely Disagree <-----> Extremely Agree						
	1	2	3	4	5	6	7
I am satisfied with the Google LMS platform functions	1%	1%	2%	13%	33%	29%	22%
I am satisfied with the Google LMS platform content	1%	1%	3%	15%	33%	30%	17%
I am satisfied with the Google LMS platform interaction	1%	1%	5%	17%	34%	26%	17%
I feel confident operating Google LMS Platform functions	0%	1%	4%	16%	30%	30%	19%
I feel confident using online learning content in the Google LMS Platform	1%	2%	5%	15%	30%	26%	22%
I feel confident that when I need help using the Google LMS Platform, guidance is available to me	1%	2%	7%	17%	28%	26%	18%

In terms of the six constructivist dimensions reflected in COLLES, the graph below displays the mean scores for both the preferred and actual experience ratings.

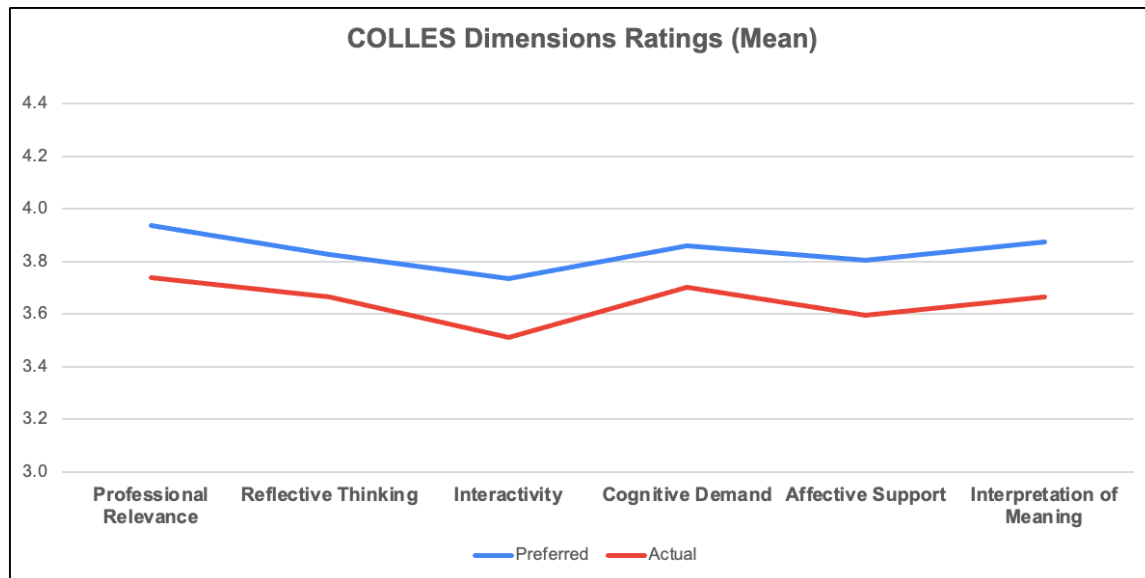


Figure 1. Students' ratings of their preferred and actual online learning environment (N=526)

It is apparent that the average ratings for the actual experience are lower than the preferred experience for all COLLES dimensions. To investigate this further, we compared the students' ratings for their preferred experience and actual experience for all the 18 statements using a paired t-test. It was found that a significant difference exists for all items as shown in table 3.

Table 3. Comparison of the students' preferred and actual experience rating

Statements corresponding to the six dimensions in COLLES		Preferred Experience (mean)	Actual Experience (mean)	t	p
Professional Relevance	My online learning experience through the Google LMS Platform focuses on topics that are interesting to me	3.8	3.6	5.0	<.001
	I prefer that the topics taught through the Google LMS Platform is important for my future profession.	4.0	3.8	4.9	<.001
	Through the Google LMS Platform, I can improve my skills for my future profession.	4.0	3.8	4.7	<.001
Reflective Thinking	Through the Google LMS Platform, I can think critically about how I learn.	3.9	3.7	3.7	<.001
	Through the Google LMS Platform, I can think critically about my own ideas.	3.9	3.7	4.0	<.001
	Through the Google LMS Platform, I can think critically about the ideas of my classmates.	3.7	3.5	3.9	<.001
Interactivity	Through the Google LMS Platform, I can explain my ideas to my classmates.	3.8	3.5	5.7	<.001
	Through the Google LMS Platform, I can ask my classmates to explain their ideas.	3.8	3.5	5.3	<.001
	Through the Google LMS Platform, my classmates can ask or response to me about my ideas.	3.7	3.5	5.5	<.001

Cognitive Demand	Through the Google LMS Platform, the teachers stimulate my thinking.	3.8	3.7	4.1	<.001
	Through the Google LMS Platform, the teachers encourage me to participate.	3.9	3.7	4.6	<.001
	Through the Google LMS Platform, the teachers serve as models of good communication and reflection.	3.9	3.7	4.7	<.001
Affective Support	Through the Google LMS Platform, my classmates could encourage me to participate.	3.8	3.6	4.2	<.001
	Through the Google LMS Platform, my classmates could appreciate my contribution.	3.8	3.6	5.9	<.001
	Through the Google LMS Platform, my classmates could understand and empathize with my challenges to learn.	3.8	3.6	4.8	<.001
Interpretation of Meaning	Through the Google LMS Platform, I can make good sense of my classmates' ideas and messages.	3.8	3.6	6.0	<.001
	Through the Google LMS Platform, I can make good sense of my teachers' ideas and messages.	3.9	3.7	4.4	<.001
	Through the Google LMS Platform, my classmates and teachers can make good sense of my ideas and messages.	3.9	3.7	4.8	<.001

Students, in general, have indicated high expectations for professional relevance, reflective thinking, cognitive demand, and interpretation of meaning. They expect their online learning to be important (mean = 4.0) and can improve their skills (mean=4.0) for their future profession. They also want the virtual environment to help them in thinking critically about how they learn (mean=3.9) and to reflect their own ideas (mean=3.9). They prefer that their teachers serve as models of good communication and reflection (mean=3.9) and that they encourage the students to participate more in the online platform (mean=3.9). They expect that through the platform, they can make good sense of their teachers' ideas and messages (mean=3.9) and in turn their classmates and teachers can make good sense of their ideas and messages (mean=3.9).

Among the lowest when it comes to their actual experience rating are those under the interactivity dimension, all of which have a mean of 3.5: explaining their ideas to their classmates, and asking their classmates to explain their ideas, and having their classmates ask or response to them about their ideas. Related to this is another statement from reflective thinking on thinking critically about the ideas of their classmates (mean=3.5). Moreover, when asked which specific feature they think needs improvement the most, the one that had the highest votes (248 or 47%) was on class interaction (communicating with the teacher and classmates). Specifically, they want a feature where they can create a group chat within the virtual classroom where they can collaborate, discuss, or brainstorm ideas.

The significant difference between what students prefer and expect to experience in the online learning platform compared to how they perceive their actual experience could serve as prompt to both administrators and educators. This could be a reflection that, with reference to the constructivist learning theory, the use of LMS should be done with the care and nuance that the online environment allows students to actively construct their own knowledge and understanding through experiences and interactions.

5. Conclusion and Recommendation

This study explored students' perceptions and experiences with an online Learning Management System (LMS) and its alignment with key aspects of a constructivist learning environment. A survey was conducted with 526 college students from a public university in the Philippines to assess their usage, confidence, and satisfaction with Google LMS. The survey included questions from the Constructivist Online Learning Environment Survey (COLLES) to measure students' preferred and actual experiences regarding the LMS's professional relevance, reflective thinking, interactivity, cognitive demand, affective support, and interpretation of meaning. Most students had experience with various LMSs and had been using online learning platforms for over two years. Results indicated a significant positive relationship between students' satisfaction and confidence in using the LMS.

However, there was a significant discrepancy between students' preferred and actual experiences across all six COLLES dimensions. This finding suggests that students' expectations were not met, highlighting the need for administrators and teachers to ensure that online learning platforms facilitate active knowledge construction and meaningful interactions. Although the COLLES tool does not necessarily mean it sets the standard, it can assist in examining the quality of online learning environments. Not meeting the expectations of students is not entirely an indicator of failure in implementation but a call to action to check the guidelines, learning plans, utilization or the integration of the LMS to the overall curriculum. As a recommendation, a study to revisit current implementation of online learning whether as a stand-alone modality or supplemental to traditional face to face instruction (hybrid set up) may be conducted. It could specifically aim to identify how features can be utilized by schools such that students can maximize the affordances of LMS so they can construct knowledge by reflecting upon their experiences, building their own representations and incorporating new information into their pre-existing knowledge, rather than just passively take in information.

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